



US005998786A

United States Patent [19][11] **Patent Number:** **5,998,786****Movaghar et al.**[45] **Date of Patent:** ***Dec. 7, 1999**

[54] **APPARATUS FOR SECURING CCD BOARD
AT A FIXED POSITION WITHIN A RANGE
OF MOTION**

5,736,738 4/1998 Movaghar et al. 250/239

[75] **Inventors:** **Abdolreza Movaghar; Josephine del
Rosario; Mark Diel; David J.
Schmeling, all of San Diego, Calif.**

Primary Examiner—Stephone Allen
Attorney, Agent, or Firm—Jerry R. Potts

[73] **Assignee:** **Hewlett-Packard Company, Palo Alto,
Calif.**

[*] **Notice:** This patent is subject to a terminal disclaimer.

[21] **Appl. No.:** **09/009,526**

[22] **Filed:** **Jan. 20, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/701,619, Aug. 22, 1996,
Pat. No. 5,736,738.

[51] **Int. Cl.⁶** **A47G 29/02; E04G 3/08;
E06B 7/28**

[52] **U.S. Cl.** **250/239; 250/234; 250/504 R**

[58] **Field of Search** **250/216, 234-236,
250/239, 504 R; 524/533; 358/494**

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,367,399	11/1994	Kramer	250/236
5,391,009	2/1995	Stodder	400/605
5,463,212	10/1995	Oshina et al.	250/239
5,477,047	12/1995	Nakagawa et al.	250/239

[57] ABSTRACT

Apparatus for fixing the position of an optical sensor within a range of motion in relation to an optical apparatus. The fixing apparatus provides permits a range of motion through five degrees of freedom (DOF) during the securing process. The apparatus includes a housing for the optical assembly, a middle bracket, with the middle bracket secured to the optical apparatus. The range of motion is provided by a gimbal design in the housing and middle bracket which creates the five DOF. There are no screws involved in the fixing process to impart torques or forces to the parts being aligned and secured in position. An ultraviolet (UV) activated adhesive is used to secure the sensor housing to the middle bracket and the middle bracket to the optical scanner housing. The middle bracket is formed of a material transparent to UV light, and a high percentage of the UV light can pass through it to cure the adhesive applied between the parts. A vertical hole runs through tabs of both the housing and the middle bracket. The adhesive is applied into this region where it is constrained by the parts. The adhesive is a liquid during the alignment process which allows relative motion between the parts. When alignment is complete, the adhesive region is exposed to UV light which cures the adhesive into a solid vertical column, creating a form of chemical rivet. This chemical rivet provides a very strong mechanical interlock of the components in addition to the adhesive bonding of the components.

23 Claims, 6 Drawing Sheets